

What is claimed is:

1. A display apparatus having a plurality of electron emitters arrayed in association with a plurality of pixels, for emitting electrons from the electron emitters to display an image, characterized in that

necessary charges are accumulated in all the electron emitters in a first period; and

a voltage required to emit electrons is applied to all the electron emitters to cause a plurality of electron emitters which correspond to pixels to emit light therefrom, for emitting light from said pixels, in a second period after said first period.

2. A display apparatus according to claim 1, characterized by:

a drive circuit for scanning all the electron emitters to apply necessary voltages to the electron emitters;

wherein one image is displayed in a period as one frame, said one frame including said first period and said second period;

wherein said drive circuit scans all said electron emitters and applies accumulation voltages depending on the luminance levels of corresponding pixels to the electron emitters which correspond to pixels to emit light therefrom in said first period, and applies a constant emission voltage to all the electron emitters in the second period

after said first period;

wherein charges in amounts depending on the luminance levels of corresponding pixels are accumulated in the electron emitters which correspond to pixels to emit light therefrom in said first period; and

wherein electrons are emitted in amounts depending on the luminance levels of corresponding pixels from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

3. A display apparatus according to claim 1, characterized by:

a drive circuit for scanning all the electron emitters to apply necessary voltages to the electron emitters;

wherein one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having respective different luminance levels, each of said periods serving as one subfield, said one subfield including said first period and said second period;

wherein said drive circuit scans all said electron emitters and applies a constant accumulation voltage to the electron emitters to emit light therefrom in said first period, and applies emission voltages depending on luminance levels assigned to the subfields to all said electron emitters in the second period after said first period;

wherein a constant amount of charges are accumulated in

the electron emitters to emit light therefrom in said first period; and

wherein electrons are emitted in amounts depending on the luminance levels assigned to the subfields from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

4. A display apparatus according to claim 1, characterized by:

a drive circuit for scanning all the electron emitters to apply necessary voltages to the electron emitters;

wherein one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having respective different luminance levels, each of said periods serving as one subfield, said one subfield including said first period and said second period;

wherein said drive circuit scans all said electron emitters and applies accumulation voltages depending on luminance levels assigned to the subfields to the electron emitters to emit light therefrom in said first period, and applies a constant emission voltage to all said electron emitters in the second period after said first period;

wherein charges in amounts depending on the luminance levels assigned to the subfields are accumulated in the electron emitters to emit light therefrom in said first period; and

wherein electrons are emitted in amounts depending on the luminance levels assigned to the subfields from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

5. A display apparatus according to claim 1, characterized by:

a drive circuit for scanning all the electron emitters to apply necessary voltages to the electron emitters;

wherein one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having the same luminance level, each of said periods serving as one linear subfield, said one linear subfield including said first period and said second period;

wherein said drive circuit scans all said electron emitters and applies a constant accumulation voltage to the electron emitters to emit light therefrom in said linear subfields in said first period, and applies a constant emission voltage to all said electron emitters in the second period after said first period;

wherein a constant amount of charges are accumulated in the electron emitters to emit light therefrom in said linear subfields in said first period; and

wherein a constant amount of electrons are emitted from the electron emitters which correspond to pixels to emit light therefrom in the linear subfields in said second

period, thereby emitting light from the pixels.

6. A display apparatus according to claim 1,
characterized by:

5 a drive circuit for scanning all the electron emitters
to apply necessary voltages to the electron emitters;

 wherein one image is displayed in a period as one
frame, said one frame including said first period and said
second period;

10 wherein said drive circuit applies a constant
accumulation voltage to all said electron emitters in said
first period, and scans all said electron emitters and
applies emission voltages depending on the luminance levels
of corresponding pixels to the electron emitters which
15 correspond to pixels to emit light therefrom in said second
period after said first period;

 wherein a constant amount of charges are accumulated in
all said electron emitters in said first period; and

20 wherein electrons are emitted in amounts depending on
the luminance levels of corresponding pixels from the
electron emitters which correspond to pixels to emit light
therefrom in said second period, thereby emitting light from
the pixels.

25 7. A display apparatus according to claim 1,
characterized by:

 a drive circuit for scanning all the electron emitters

to apply necessary voltages to the electron emitters;

wherein one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having respective different luminance levels, each of said periods serving as one subfield, said one subfield including said first period and said second period;

wherein said drive circuit applies accumulation voltages depending on luminance levels assigned to the subfields to all said electron emitters to emit light therefrom in said first period, and scans all said electron emitters and applies a constant emission voltage to said electron emitters to emit light therefrom in the second period after said first period;

wherein charges in amounts depending on the luminance levels assigned to the subfields are accumulated in all said electron emitters in said first period; and

wherein electrons are emitted in amounts depending on the luminance levels assigned to the subfields from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

8. A display apparatus according to claim 1, characterized by:

a drive circuit for scanning all the electron emitters to apply necessary voltages to the electron emitters;

wherein one image is displayed in a period as one

frame, said one frame being divided into a plurality of periods having respective different luminance levels, each of said periods serving as one subfield, said one subfield including said first period and said second period;

5 wherein said drive circuit applies a constant accumulation voltage to all said electron emitters in said first period, and scans all said electron emitters and applies emission voltages depending on the luminance levels assigned to the subfields to the electron emitters to emit
10 light therefrom in said second period after said first period;

 wherein a constant amount of charges are accumulated in all said electron emitters in said first period; and

 wherein electrons are emitted in amounts depending on
15 the luminance levels assigned to the subfields from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

20 9. A display apparatus according to claim 1, characterized by:

 a drive circuit for scanning all the electron emitters to apply necessary voltages to the electron emitters;

 wherein one image is displayed in a period as one
25 frame, said one frame being divided into a plurality of periods having the same luminance level, each of said periods serving as one linear subfield, said one linear

subfield including said first period and said second period;

wherein said drive circuit applies a constant accumulation voltage to all said electron emitters in said first period, and scans all said electron emitters and applies a constant emission voltage to the electron emitters to emit light therefrom in the linear subfields in said second period after said first period;

wherein a constant amount of charges are accumulated in the electron emitters to emit light therefrom in the linear subfields in said first period; and

wherein a constant amount of electrons are emitted from the electron emitters which correspond to pixels to emit light therefrom in the linear subfields in said second period, thereby emitting light from the pixels.

10. A display apparatus according to claim 2, characterized in that

said drive circuit comprises:

a pulse generating circuit for generating a pulse signal having a constant pulse amplitude; and

an amplitude modulating circuit for amplitude-modulating said pulse signal to generate said accumulation voltage in said first period.

11. A display apparatus according to claim 2, characterized in that

said drive circuit comprises:

a pulse generating circuit for generating a pulse signal applicable to said electron emitters, said pulse signal having a voltage waveform including a positive-going edge or a negative-going edge which is continuously variable in level; and

a pulse width modulating circuit for pulse-width-modulating said pulse signal to generate said accumulation voltage in said first period.

12. A display apparatus according to claim 3, characterized in that

said drive circuit comprises:

a pulse generating circuit for generating a pulse signal having a constant pulse amplitude; and

an amplitude modulating circuit for amplitude-modulating said pulse signal to generate said emission voltage in said second period.

13. A display apparatus according to claim 3, characterized in that

said drive circuit comprises:

a pulse generating circuit for generating a pulse signal applicable to said electron emitters, said pulse signal having a voltage waveform including a positive-going edge or a negative-going edge which is continuously variable in level; and

a pulse width modulating circuit for pulse-width-

modulating said pulse signal to generate said emission voltage in said second period.

5 14. A display apparatus according to claim 1, wherein
said electron emitters have such characteristics that the
electron emitters change to a state (first state) in which
electrons are accumulated when an electric field is applied
in one direction to said electron emitters, and change from
said first state to a state (second state) in which
10 electrons are emitted when an electric field is applied in
another direction to said electron emitters, and said drive
circuit is controlled to apply a voltage between a voltage
for changing the electron emitters to said first state and a
voltage for changing the electron emitters to a state
15 immediately prior to said second state, to electron emitters
which are unselected.

15 15. A display apparatus according to claim 2,
characterized in that

20 said electron emitters are selected and unselected
through corresponding select lines; and

 said drive circuit places the select lines of electron
emitters which are unselected into a high impedance state.

25 16. A display apparatus characterized by:
a plurality of electron emitters;
select lines for selecting and unselecting said

electron emitters;

signal lines for supplying ON and OFF signals to
electron emitters which are selected; and

5 a drive circuit for driving the electron emitters in a
selection period, a reset period, and a non-selection period
allocated to one frame which is a period for displaying one
image;

10 wherein said drive circuit applies a voltage sufficient
to cause the electron emitters to emit light, to electron
emitters to emit light therefrom which are selected in said
selection period;

15 applies a reference voltage serving as a central
voltage across which a voltage varies in the non-selection
period subsequent to the reset period, to electron emitters
which are selected in said reset period; and

places the select lines of electron emitters which are
unselected in said non-selection period into a high
impedance state.

20 17. A display apparatus according to claim 16,
characterized in that

said non-selection period subsequent to the reset
period has a time duration set depending on the gradation
level of a next frame.

25 18. A display apparatus according to claim 16,
characterized in that

said non-selection period has a first non-selection period assigned prior to said reset period and a second non-selection period assigned subsequent to said reset period; and

5 said second non-selection period has a time duration set depending on the gradation level of a next frame.

19. A method of driving a display apparatus having a plurality of electron emitters arrayed in association with a plurality of pixels, for emitting electrons from the
10 electron emitters to display an image, characterized by:

 the step of accumulating necessary charges in all the electron emitters in a first period; and

 the step of applying a voltage required to emit
15 electrons to all the electron emitters to cause a plurality of electron emitters which correspond to pixels to emit light therefrom, for emitting light from said pixels, in a second period after said first period.

20 20. A method for driving a display apparatus according to claim 19, characterized in that

 one image is displayed in a period as one frame, said one frame including said first period and said second period; and characterized by

25 the step of scanning all said electron emitters, and applying accumulation voltages depending on the luminance levels of corresponding pixels to the electron emitters

which correspond to pixels to emit light therefrom in said first period, to accumulate charges in amounts depending on the luminance levels of corresponding pixels in the electron emitters which correspond to pixels to emit light therefrom in said first period; and

the step of applying a constant emission voltage to all the electron emitters in the second period after said first period, to emit electrons in amounts depending on the luminance levels of corresponding pixels from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

21. A method for driving a display apparatus according to claim 19, characterized in that

one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having respective different luminance levels, each of said periods serving as one subfield, said one subfield including said first period and said second period; and characterized by

the step of scanning all said electron emitters, applying a constant accumulation voltage to the electron emitters to emit light therefrom in said first period, to accumulate a constant amount of charges in the electron emitters to emit light therefrom in said first period; and

the step of applying emission voltages depending on luminance levels assigned to the subfields to all said

electron emitters in the second period after said first period, to emit electrons in amounts depending on the luminance levels assigned to the subfields from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

22. A method for driving a display apparatus according to claim 19, characterized in that

one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having respective different luminance levels, each of said periods serving as one subfield, said one subfield including said first period and said second period; and characterized by

the step of scanning all said electron emitters, and applying accumulation voltages depending on luminance levels assigned to the subfields to the electron emitters to emit light therefrom in said first period, to accumulate charges in amounts depending on the luminance levels assigned to the subfields in the electron emitters to emit light therefrom in said first period; and

the step of applying a constant emission voltage to all said electron emitters in the second period after said first period, to emit electrons in amounts depending on the luminance levels assigned to the subfields from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the

pixels.

23. A method for driving a display apparatus according to claim 19, characterized in that

5 one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having the same luminance level, each of said periods serving as one linear subfield, said one linear subfield including said first period and said second period; and characterized by

10 the step of scanning all said electron emitters, and applying a constant accumulation voltage to the electron emitters to emit light therefrom in said linear subfields in said first period, to accumulate a constant amount of charges in the electron emitters to emit light therefrom in
15 said linear subfields in said first period; and

 the step of applying a constant emission voltage to all said electron emitters in the second period after said first period, to emit a constant amount of electrons from the electron emitters which correspond to pixels to emit light
20 therefrom in the linear subfields in said second period, thereby emitting light from the pixels.

24. A method for driving a display apparatus according to claim 19, characterized in that

25 one image is displayed in a period as one frame, said one frame including said first period and said second period; and characterized by

the step of applying a constant accumulation voltage to all said electron emitters in said first period to accumulate a constant amount of charges in all said electron emitters in said first period; and

5 the step of scanning all said electron emitters and applying emission voltages depending on the luminance levels of corresponding pixels to the electron emitters which correspond to pixels to emit light therefrom in said second period after said first period, to emit electrons in amounts
10 depending on the luminance levels of corresponding pixels from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

15 25. A method for driving a display apparatus according to claim 19, characterized in that

one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having respective different luminance levels, each of said periods
20 serving as one subfield, said one subfield including said first period and said second period; and characterized by

the step of applying accumulation voltages depending on luminance levels assigned to the subfields to all said electron emitters to emit light therefrom in said first
25 period, to accumulate charges in amounts depending on the luminance levels assigned to the subfields in all said electron emitters in said first period; and

the step of scanning all said electron emitters and applying a constant emission voltage to said electron emitters to emit light therefrom in the second period after said first period, to emit electrons in amounts depending on the luminance levels assigned to the subfields from the electron emitters which correspond to pixels to emit light therefrom in said second period, thereby emitting light from the pixels.

26. A method for driving a display apparatus according to claim 19, characterized in that

one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having respective different luminance levels, each of said periods serving as one subfield, said one subfield including said first period and said second period; and characterized by

the step of applying a constant accumulation voltage to all said electron emitters in said first period, to accumulate a constant amount of charges in all said electron emitters in said first period; and

the step of scanning all said electron emitters and applying emission voltages depending on the luminance levels assigned to the subfields to the electron emitters to emit light therefrom in said second period after said first period, to emit electrons in amounts depending on the luminance levels assigned to the subfields from the electron emitters which correspond to pixels to emit light therefrom

in said second period, thereby emitting light from the pixels.

27. A method for driving a display apparatus according to claim 19, characterized in that

one image is displayed in a period as one frame, said one frame being divided into a plurality of periods having the same luminance level, each of said periods serving as one linear subfield, said one linear subfield including said first period and said second period; and characterized by

applying a constant accumulation voltage to all said electron emitters in said first period, to accumulate a constant amount of charges in the electron emitters to emit light therefrom in the linear subfields in said first period; and

the step of scanning all said electron emitters and applying a constant emission voltage to the electron emitters to emit light therefrom in the linear subfields in said second period after said first period, to emit a constant amount of electrons from the electron emitters which correspond to pixels to emit light therefrom in the linear subfields in said second period, thereby emitting light from the pixels.

28. A method for driving a display apparatus according to claim 20, characterized in that

a pulse signal having a constant pulse amplitude is

generated; and

said pulse signal is amplitude-modulated to generate
said accumulation voltage in said first period.

5 29. A method for driving a display apparatus according
to claim 20, characterized in that

 a pulse signal applicable to said electron emitters is
generated, said pulse signal having a voltage waveform
including a positive-going edge or a negative-going edge
10 which is continuously variable in level; and

 said pulse signal is pulse-width-modulated to generate
said accumulation voltage in said first period.

 30. A method for driving a display apparatus according
15 to claim 21, characterized in that

 a pulse signal having a constant pulse amplitude is
generated; and

 said pulse signal is amplitude-modulated to generate
said emission voltage in said second period.

20 31. A method for driving a display apparatus according
to claim 21, characterized in that

 a pulse signal applicable to said electron emitters is
generated, said pulse signal having a voltage waveform
including a positive-going edge or a negative-going edge
25 which is continuously variable in level; and

 said pulse signal is pulse-width-modulated to generate

said emission voltage in said second period.

32. A method for driving a display apparatus according to claim 19, characterized in that

5 said electron emitters have such characteristics that the electron emitters change to a state (first state) in which electrons are accumulated when an electric field is applied in one direction to said electron emitters, and change from said first state to a state (second state) in
10 which electrons are emitted when an electric field is applied in another direction to said electron emitters; and

 a voltage between a voltage for changing the electron emitters to said first state and a voltage for changing the electron emitters to a state immediately prior to said
15 second state, is applied to electron emitters which are unselected.

33. A method of driving a display apparatus according to claim 19, characterized in that

20 said electron emitters are selected and unselected through corresponding select lines; and

 the select lines of electron emitters which are unselected are placed into a high impedance state.

25 34. A method of driving a display apparatus having a plurality of electron emitters, select lines for selecting and unselecting said electron emitters, and signal lines for

supplying ON and OFF signals to electron emitters which are selected, characterized in that the electron emitters are driven in a selection period, a reset period, and a non-selection period allocated to one frame which is a period for displaying one image;

wherein a voltage sufficient to cause the electron emitters to emit light is applied to electron emitters to emit light therefrom which are selected in said selection period;

a reference voltage serving as a central voltage across which a voltage varies in the non-selection period subsequent to the reset period is applied to electron emitters which are selected in said reset period; and

the select lines of electron emitters which are unselected in said non-selection period is placed into a high impedance state.

35. A method of driving a display apparatus according to claim 34, characterized in that

said non-selection period subsequent to the reset period has a time duration set depending on the gradation level of a next frame.

36. A method of driving a display apparatus according to claim 34, characterized in that

said non-selection period has a first non-selection period assigned prior to said reset period and a second non-

selection period assigned subsequent to said reset period;
and

said second non-selection period has a time duration
set depending on the gradation level of a next frame.

5

37. An electron emitter characterized by
charges required for electron emission are accumulated
in a first period; and

10 a voltage required for electron emission is applied to
emit electrons in an amount depending on the accumulated
charges in a second period after said first period.

15 38. An apparatus for driving a plurality of electron
emitters by selecting at least one electron emitter from the
electron emitters and emitting electrons from the selected
electron emitter, characterized in that

20 said electron emitters have such characteristics that
the electron emitters change to a state (first state) in
which electrons are accumulated when an electric field is
applied in one direction to said electron emitters, and
change from said first state to a state (second state) in
which electrons are emitted when an electric field is
applied in another direction to said electron emitters; and

25 a voltage between a voltage for changing the electron
emitters to said first state and a voltage for changing the
electron emitters to a state immediately prior to said
second state, is applied to electron emitters which are

unselected among the plurality of electron emitters.

39. An electron emission apparatus having a plurality of electron emitters, characterized in that

5 charges required for electron emission are accumulated in all the electron emitters in a first period; and

a voltage required for electron emission is applied to all the electron emitters to emit electrons in an amount depending on the charges accumulated in said electron
10 emitters in a second period after said first period.

40. An electron emission apparatus according to claim 39, characterized in that

15 accumulation voltages depending on charges to be accumulated in said electron emitters are applied in said first period; and

a constant emission voltage is applied to all said electron emitters in the second period after said first period.

20 41. An electron emission apparatus according to claim 40, characterized by

a pulse generating circuit for generating a pulse signal having a constant pulse amplitude; and

25 an amplitude modulating circuit for amplitude-modulating said pulse signal to generate said accumulation voltage in said first period.

42. An electron emission apparatus according to claim 40, characterized by

a pulse generating circuit for generating a pulse signal applicable to said electron emitters, said pulse signal having a voltage waveform including a positive-going edge or a negative-going edge which is continuously variable in level; and

a pulse width modulating circuit for pulse-width-modulating said pulse signal to generate said accumulation voltage in said first period.

43. An electron emission apparatus having a plurality of electron emitters, characterized in that

a constant accumulation voltage is applied to all said electron emitters to accumulate a constant amount of charges in said electron emitters in a first period; and

emission voltages depending on amounts of electrons to be emitted are applied to said electron emitters to cause said electron emitters to emit electrons in the amounts depending on the emission voltages in a second period after said first period.

44. An electron emission apparatus according to claim 43, characterized by

a pulse generating circuit for generating a pulse signal having a constant pulse amplitude; and

an amplitude modulating circuit for amplitude-

modulating said pulse signal to generate said emission voltage in said second period.

5 45. An electron emission apparatus according to claim 43, characterized by

a pulse generating circuit for generating a pulse signal applicable to said electron emitters, said pulse signal having a voltage waveform including a positive-going edge or a negative-going edge which is continuously variable in level; and

10 a pulse width modulating circuit for pulse-width-modulating said pulse signal to generate said emission voltage in said second period.

15 46. An electron emission apparatus according to claim 39, characterized in that

said electron emitters have such characteristics that the electron emitters change to a state (first state) in which electrons are accumulated when an electric field is applied in one direction to said electron emitters, and change from said first state to a state (second state) in which electrons are emitted when an electric field is applied in another direction to said electron emitters; and characterized by

25 a drive circuit for applying a voltage between a voltage for changing the electron emitters to said first state and a voltage for changing the electron emitters to a

state immediately prior to said second state, to electron emitters which are unselected.

47. A method of driving an electron emitter,
5 characterized by

the step of accumulating charges required for electron emission in a first period; and

the step of applying a voltage required for electron emission to emit electrons in an amount depending on the
10 accumulated charges in a second period after said first period.

48. A method of driving a plurality of electron emitters by selecting at least one electron emitter from the
15 electron emitters and emitting electrons from the selected electron emitter, characterized in that

said electron emitters have such characteristics that the electron emitters change to a state (first state) in which electrons are accumulated when an electric field is
20 applied in one direction to said electron emitters, and change from said first state to a state (second state) in which electrons are emitted when an electric field is applied in another direction to said electron emitters; and

a voltage between a voltage for changing the electron emitters to said first state and a voltage for changing the
25 electron emitters to a state immediately prior to said second state, is applied to electron emitters which are

unselected among the plurality of electron emitters.

49. A method of driving an electron emission apparatus having a plurality of electron emitters, characterized in that

charges required for electron emission are accumulated in all the electron emitters in a first period; and

a voltage required for electron emission is applied to all the electron emitters to emit electrons in an amount depending on the charges accumulated in said electron emitters in a second period after said first period.

50. A method of driving an electron emission apparatus according to claim 49, characterized in that

accumulation voltages depending on charges to be accumulated in said electron emitters are applied in said first period; and

a constant emission voltage is applied to all said electron emitters in the second period after said first period.

51. A method of driving an electron emission apparatus according to claim 50, characterized in that

a pulse signal having a constant pulse amplitude is amplitude-modulated to generate said accumulation voltage in said first period.

52. A method of driving an electron emission apparatus according to claim 50, characterized in that

a pulse signal applicable to said electron emitters is generated, said pulse signal having a voltage waveform including a positive-going edge or a negative-going edge which is continuously variable in level; and

said pulse signal is pulse-width-modulated to generate said accumulated voltage in said first period.

53. A method of driving an electron emission apparatus having a plurality of electron emitters, characterized by

the step of applying a constant accumulation voltage to all said electron emitters to accumulate a constant amount of charges in said electron emitters in a first period; and

the step of applying emission voltages depending on amounts of electrons to be emitted to said electron emitters to cause said electron emitters to emit electrons in the amounts depending on the emission voltages in a second period after said first period.

54. A method of driving an electron emission apparatus according to claim 53, characterized in that

a pulse signal having a constant pulse amplitude is amplitude-modulated to generate said emission voltage in said second period.

55. A method of driving an electron emission apparatus

according to claim 53, characterized in that

a pulse signal applicable to said electron emitters is generated, said pulse signal having a voltage waveform including a positive-going edge or a negative-going edge which is continuously variable in level; and

said pulse signal is pulse-width-modulated to generate said emission voltage in said second period.

56. A method of driving an electron emission apparatus according to claim 49, characterized in that

said electron emitters have such characteristics that the electron emitters change to a state (first state) in which electrons are accumulated when an electric field is applied in one direction to said electron emitters, and change from said first state to a state (second state) in which electrons are emitted when an electric field is applied in another direction to said electron emitters; and

a voltage between a voltage for changing the electron emitters to said first state and a voltage for changing the electron emitters to a state immediately prior to said second state, is applied to electron emitters which are unselected.